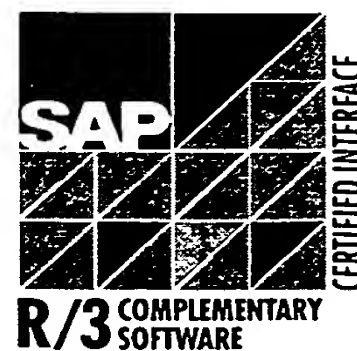


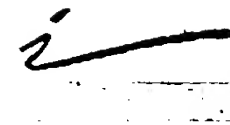
Integrating SAP R/3 and i2's RHYTHM

Using the POI (Production Optimization Interface)

White Paper

WP-206





Production Planning and Optimization with Rhythm

The SAP® Production Optimization Interface (POI) allows R/3™ users to perform production planning and optimization with the Rhythm® family of products, including:

- Simultaneous constraint-based planning of material and capacity
- Variable granularity of planning (months, days, hours, minutes, and even seconds)
- Multi-plant coordination of production
- Assembly coordination among multiple BOM levels
- Other advanced planning functionality such as block planning
- Decision support functions such as identifying the impact on sales orders of material or capacity constraints in the production plan
- High-speed automatic and interactive planning functions such as load smoothing or dynamic material assignment
- Global optimization using advanced artificial intelligence techniques and mathematical programming algorithms

i2 Technologies is a leading development partner for the POI and is the first partner to obtain certification from SAP's Complementary Software Program. SAP and i2 developers working at SAP's world headquarters in Walldorf, Germany, jointly created the data mapping between R/3 and i2's Rhythm.

A common question is, "Where do I run MRP?" Requirements planning is the first step of intelligent planning, followed of course by other constraint-based planning steps. With the POI, for specific materials and workcenters the user may choose whether material and/or capacity requirements planning are conducted in R/3 or in Rhythm. With the POI, the user also may choose for all requirements planning to be performed in Rhythm. Requirements planning in Rhythm is memory-resident thus it is extremely fast.

Integration Technology

The POI takes advantage of SAP's Application Link Enabling (ALE) technology to exchange data between R/3 and Rhythm. ALE is used to link distributed R/3 and R/2 systems with one another and with external applications. Using ALE, IDocs (intermediate documents) containing master data and/or transactional data are sent from R/3 to Rhythm over either an intranet or the internet.

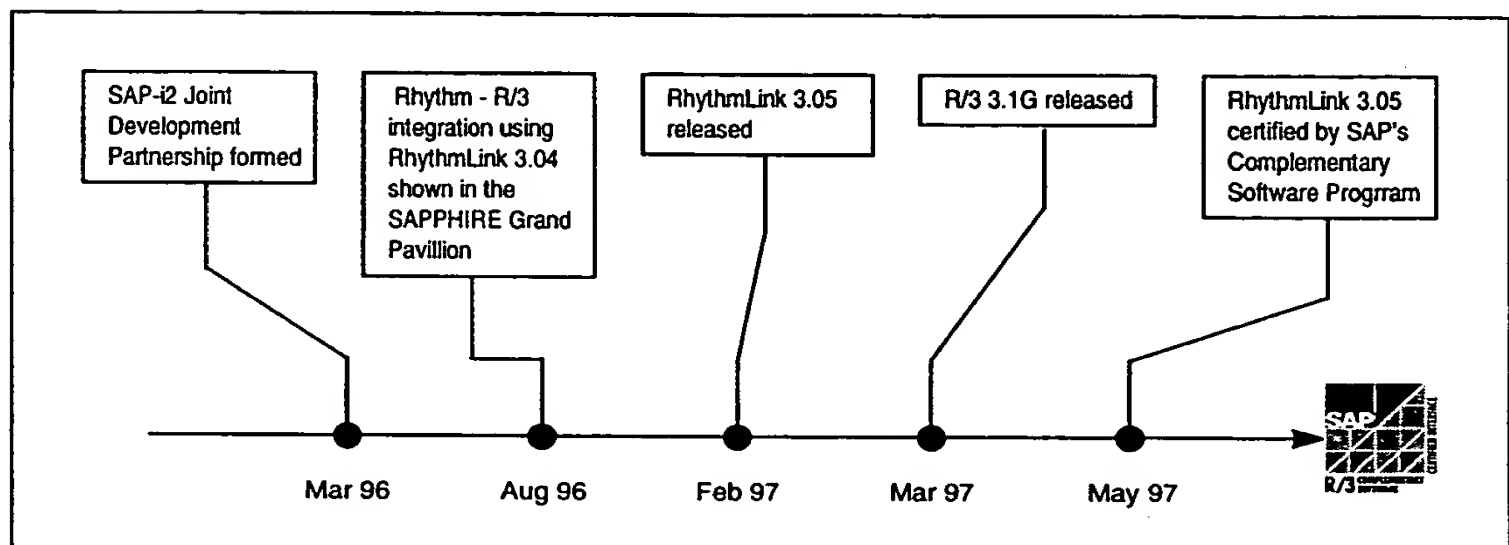
i2's RhythmLink product acts as a data conduit between Rhythm and other applications such as R/3. IDocs have a hierarchical structure that is understood by RhythmLink. Each IDoc type in R/3 (Material Master, Routing, etc.) contains meta data that defines the specific structure of the segments and fields in the IDoc. New meta data or a completely new IDoc type? No problem. Unlike other packages, RhythmLink reads this meta data directly from R/3, so if new IDoc types are defined or if the structure of an existing IDoc type is changed, these changes will be reflected automatically in RhythmLink. This feature allows users to modify and extend the integration between Rhythm and R/3 without programming and is quite convenient during interface design.

Typically a RhythmLink event would be defined to process each IDoc type. Using RhythmLink events, a message and its associated data are received at the same time, allowing true real-time synchronization between sender and receiver. When an event is triggered (e.g., the arrival of an IDoc), event instructions are processed. The instructions are defined with RhythmLink's easy to use point-and-click GUI.

Field bindings define the mapping between the various data sources (such as IDocs) to Rhythm objects and vice versa. Bindings are defined with an intuitive drag-and-drop editor. RhythmLink contains a variety of other features necessary for easy integration, such as capabilities to filter data based on criteria and to join data from different data sources. RhythmLink has been designed for maximum throughput. Filters, joins, aggregations, net-change operations, and bindings are all executed in memory. When possible, these functions are pushed back to the data source for execution, leveraging performance features built into tools such as database management systems.

Interprocess communication is performed via SAP's Remote Function Call (RFC) facility. Technically speaking, transactional RFC's are used for the exchange of data from R/3 to Rhythm, and synchronous RFC's are used for the exchange of data from Rhythm to R/3.

RhythmLink provides a unique way to define RFC's. Normally an RFC would be written in a compiled programming language such as C and would require a recompilation whenever changes are made. The name, arguments, and implementation of the RFC would be specified within the program. Changes would be painful to make because everything is hardcoded. Instead of this fixed approach to implementation, RhythmLink takes a meta-layer approach. RFC definitions are modeled in RhythmLink such that they are data-driven and hence are end-user configurable. RFC definitions include the RFC name, import and export parameters, tables, and also the implementation. These are all defined in RhythmLink without programming, and users can make adjustments to the integration when business processes change.



As shown on the following timeline, all of the capabilities discussed are available in *released* software that is *certified* by SAP's Complementary Software Program.

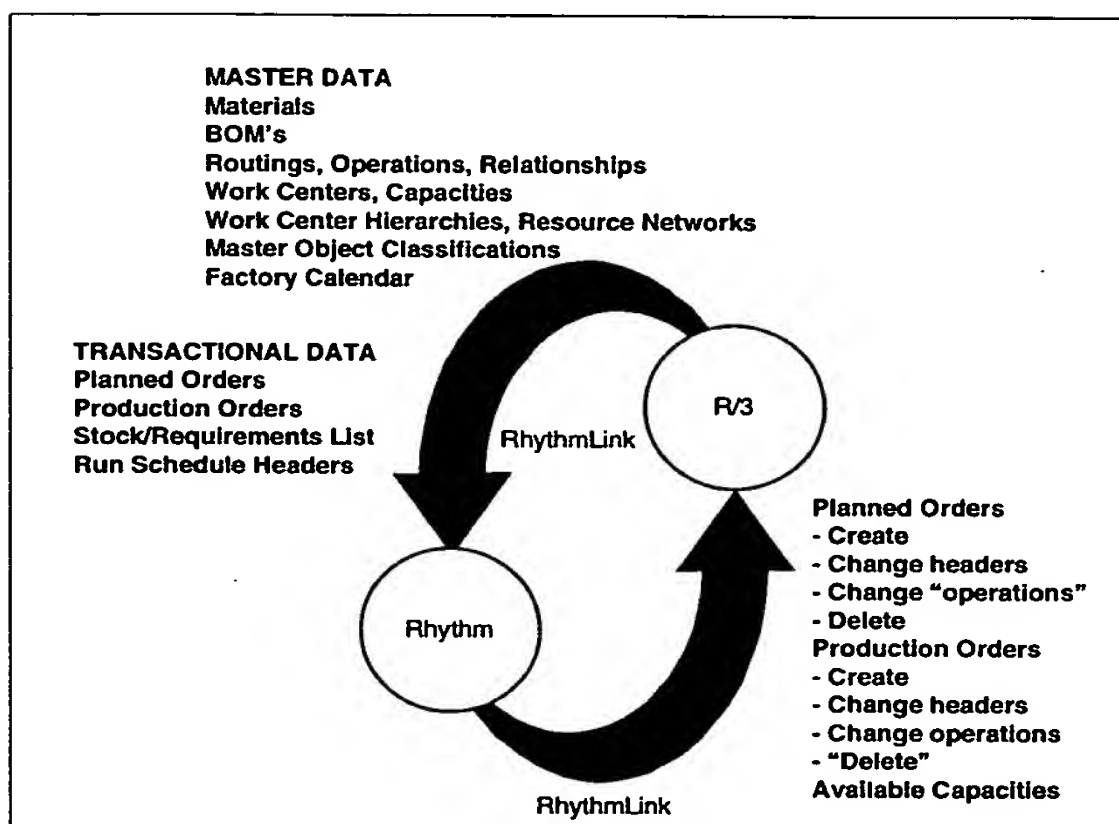
Integration Scenario

The following is a typical scenario of how RhythmLink exchanges data between R/3 and Rhythm.

R/3 to Rhythm

The arrival of an IDoc is an event to which RhythmLink responds. IDocs may be either for master data or transactional data. RhythmLink processes the data in the IDoc according to the instructions for the event, which could include filters, aggregations, net-change operations, and joins. The event culminates with a set of bindings to Rhythm fields. RhythmLink then imports the processed data into a running Rhythm planning engine.

Because RhythmLink is architected for event-triggered integration, important changes in the R/3 system can be imported into Rhythm on a net-change basis and planning can begin immediately. For data that is not time-critical, periodic transfers usually are a more cost-effective and efficient use of hardware resources.



Rhythm to R/3

As portions of the plan are finalized, these may be communicated to R/3 so that other business functions such as procurement may be performed. Data exchange between Rhythm and R/3 is once again performed by an event (which also can be called on a periodic basis). First, the delta's to the plan are computed. The delta's define what changes to the plan stored in R/3 need to be made (sometimes plan delta's are referred to as synchronization messages). For example, order start times, order end times, and various operation times may be changed. Orders may be created or deleted. Order quantities or routings may be changed. Second, the event references bindings that define how fields of the Rhythm plan are stored as Planned Orders and/or Production Orders in the R/3 system. Third, the appropriate RFC calls are made and the POI functions on the R/3 side are executed to process and post the data.



Summary

The integration of Rhythm and R/3 uses the same techniques that are used within R/3 systems for integration: ALE and RFC. The capabilities of RhythmLink to read IDoc meta data directly from R/3 and to define and implement RFC's in a data-driven manner allow users to modify and extend the integration without programming. Standard SAP concepts and technologies are used that will be maintained in future releases. Consequently, this integration truly is designed for the long term, and implementations of the integration can be made with confidence.

The POI has been available since R/3 3.1G (released March 1997). With the POI and Rhythm, customers can "drive their business" using constraint-based planning processes. They will realize improvements in throughput, delivery performance, responsiveness, inventory turns, lead time, and/or operating expenses.

RhythmLink Product Features

RhythmLink acts as a data conduit between Rhythm and other applications or data sources including ...

- Relational databases (Oracle, Informix, Sybase, DB2, etc.)
- ERP systems (SAP, Oracle, SSA, JD Edwards, Baan, etc.)
- Legacy and third-party applications (configuration, shop floor data collection, etc.)
- ASCII files

Data sources are accessed via middleware such as ...

- SAP (ALE/IDoc, RFC, BAPI)
- SequeLink
- ODBC
- CORBA

Functionality for Interface and Integration Design includes ...

- Events
- Graphical navigation through data sources
- Creation of bindings by an intuitive drag-and-drop editor
- Data Filters
- Data Joins
- Data Aggregation
- Computation of delta's to the plan
- Data-driven RFC definitions
- Reading of IDoc meta data directly from R/3
- Industry-accepted, standard technologies. As new technologies become mainstream, RhythmLink will leverage or provide links to these technologies.

